

*Sub B1*  
15. (Amended) The method according to claim 1 wherein:  
the first temperature is approximately 600°C; and  
the second layer is formed at a second temperature that is lower than the first.

Please add the following new claims:

*A3*  
24. (New) The method of claim 1 wherein the second layer is formed from a fluorine containing compound.

*Sub B1*  
25. (New) The method of claim 24 wherein the fluorine containing compound comprises  $WF_6$ .

*Cont'd*  
26. (New) The method of claim 2 wherein the second layer is formed from a fluorine containing compound.

27. (New) The method of claim 26 wherein the fluorine containing compound comprises  $WF_6$ .

#### REMARKS

Claims 1, 2, 4-8, 10 and 15-27 are now in the application. Claims 1, 2, 4-8, 10, 15 and 21-27 are drawn to the elected invention. Claims 16-20 are drawn to non-elected invention and may be cancelled by the Examiner upon the allowance of the claims directed to the elected invention.

Claims 1 has been amended by reciting recitations from claims 3 and 9 and to clarify the temperatures used for the first and second layers. Claim 15 has been amended to change its dependency. New claims 24-27 find support, for instance, at page 5, lines 4-7 of the specification.

The rejection of claims 9 and 15 under 35 U.S.C. §112, second paragraph have been overcome by the cancellation of claim 9 and the amendments to the claims. In particular, claim 1 has been amended to clarify which temperature range is used for the first layer and which temperature range is used for the second layer.

The rejection of claim 1-3, 5-8, 22 and 23 under 35 U.S.C. §102 (a) as being anticipated by U.S. Patent 6,303,480 to Desai et al. has been rendered moot by the amendment to claim 1

that includes recitations from prior claims 3 and 9. In particular, claim 9 was not rejected over this ground of rejection.

Claims 1-15 and 21-23 were rejected under 35 U.S.C. §103 (a) as being unpatentable over U.S. Patent 6,303,480 to Desai et al (herein also referred to as Desai) in view of U.S. Patent 6,281,118 to Park. The recited references do not render obvious the present invention.

In particular, the present invention relates to a method for filling an opening in an oxide layer over a liner layer formed on a surface of a silicon substrate. According to the present invention a first continuous layer comprising silicon is formed on the oxide layer and on the liner layer. The first continuous layer comprising silicon is formed by either a physical vapor deposition or by chemical vapor deposition at a temperature of 500°C to 650°C. A second layer comprising a refractory material is formed on the first layer at a temperature that is lower than the temperature used for forming the silicon containing layer.

As discussed in the specification, the continuous silicon layer is intended to be a sacrificial layer in that it is anticipated that it may chemically interact and combine with any fluorine that becomes available when the refractory material to provide the refractory layer is decomposed. The temperature range employed for providing the silicon containing layer is to ensure that the layer has an adequate thickness (i.e. above a mono layer) to be available to interact with any fluorine that might be present and thereby protect the underlying layers from attack by fluorine. This is especially important since the refractory layer is formed at a temperature that is lower than the temperature for the silicon layer, which in term means that the rate of forming the refractory layer slows down with an increase exposure to fluorine making the underlying layers more susceptible to attack. Desai fails to suggest or render obvious the present invention since among other things, Desai employs a temperature of about 425°C for decomposing silane to deposit a mono atomic layer of silicon (along these lines see column 6, line 20, 25-28, 35-37 and 45) on the other hand, use of higher temperatures such as the 500°C to 650°C as recited according to the present claim, results in a silicon layer that is thicker than a mono atomic layer as required by Desai. As mentioned above, it is important that the thicker layer be formed according to the present invention in order to address the problem of possible fluorine contamination. Desai does not even remotely discuss this particular problem that is addressed by the present invention.

Furthermore, Desai does not disclose the temperature employed for depositing the refractory metal. On the other hand, according to the present invention, the temperature employed must be lower than the temperature employed for the silicon containing layer.

Park fails to overcome the above-discussed deficiencies of Desai with respect to rendering obvious the present invention. In particular, Park does not disclose that a refractory metal layer is to be deposited at a temperature lower than temperature used for depositing a silicone layer. Park merely provides ranges that can be employed for both the silicone layer and metal silicide layer, which temperatures overlap each other. Accordingly, the temperature employed for the silicide layer could be the same as, lower than or higher than the temperature employed to provide the silicon layer.

Furthermore, it would not be apparent to employ the temperature range performing the silicone layer in Park since such layer has a thickness significantly greater than the mono layer required by Desai.

The mere fact that cited art may be modified in the manner suggested by the Examiner does not make this modification obvious, unless the cited art suggest the desirability of the modification. No such suggestion appears in the cited art in this matter. The Examiner's attention is kindly directed to *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002) *In re Dembiczak et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

In *Dembiczak et al.*, supra, the Court at 1617 stated: "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., C.R. Bard, Inc., v. M3 Sys., Inc., 157 F.3d. 1340, 1352, 48 USPQ2d. 1225, 1232 (Fed. Cir. 1998) (describing 'teaching or suggestion motivation [to combine]' as in 'essential evidentiary component of an obviousness holding'), In re Rouffet, 149 F. 3d 1350, 1359, 47 USPQ2d. 1453, 1459 (Fed. Cir. 1988) ('the Board must identify specifically... the reason one of ordinary skill in the art would have been motivated to select the references and combining them');...".

Also, the cited art lacks the necessary direction or incentive to those of ordinary skill in the art to render under 35 U.S.C. 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present invention needed to sustain a rejection under 35 U.S.C. 103. See *Diversitech Corp. v. Century Steps, Inc.*, 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 185 USPQ 774 (CCPA 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 U.S.C. 103. See *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

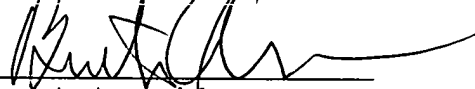
No effect can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, supra, *In re Burt et al*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

Dated: February 25, 2003

Respectfully submitted,

By   
Burton A. Amernick

Registration No.: 24,852  
CONNOLLY BOVE LODGE & HUTZ LLP  
1990 M Street, N.W., Suite 800  
Washington, DC 20036-3425  
(202) 331-7111  
(202) 293-6229 (Fax)  
Attorneys for Applicant

**Version With Markings to Show Changes Made**

1. (Amended) A method of filling an opening in an oxide layer, over a liner layer formed on a surface of a silicide substrate underlying both the oxide layer and the liner layer, comprising [the steps of]:

forming a first continuous layer comprising silicon, by either physical vapor deposition (PVD) or chemical vapor deposition (CVD) at a first temperature in the range 500°C to 650°C. on the oxide layer and on the liner layer; and

forming a second layer, comprising a refractory material, on the first layer at a second temperature that is lower than the first temperature so as to cover the same and to also substantially fill the opening.

15. (Amended) The method according to claim [14] 1 wherein:  
the first temperature is approximately 600°C; and  
the second layer is formed at a second temperature that is lower than the first.